



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF CHEMICAL SAFETY
AND POLLUTION PREVENTION

MEMORANDUM

SUBJECT: Chlorpyrifos (059101) National and State Summary Use and Usage Summary

FROM: Claire Paisley-Jones, Biologist
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BEAD (7503-P)

A handwritten signature in black ink, appearing to read "C. Paisley-Jones", is located to the right of the "FROM:" field.

THRU: Diann Sims, Chief *Diann Sims*
Science Information and Analysis Branch
BEAD (7503-P)

TO: Melissa Panger, Senior Science Advisor
Environmental Fate and Effects Division

Chlorpyrifos SIAB Use and Usage Matrix

(26 April 2018)

Introduction

The Environmental Protection Agency (EPA) has been working with the United States Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) to develop a method for assessing the risks of pesticides to endangered and threatened species. Given that many listed species range over large areas, it is necessary to consider use of pesticides on a landscape scale, rather than simply a field or a small watershed. One consideration involves the percent of the crop in a given area (relevant to a listed species' range) that is treated with a pesticide. There are uncertainties in extrapolating from national level usage data to regional and state level ranges of protected species. In particular, national level data does not distinguish if there are areas of a species' range where usage is greater or less than the average national usage. In order to address these concerns, this document provides all available estimates of pesticide usage data for chlorpyrifos, nationally and by state. All registered use sites as of April 2018 are listed although usage data are not available for every site.

The intended use of the data presented here is to inform assumptions about how chlorpyrifos is used in the United States, and the extent, variability, and rate of that usage at the state level. Pesticide usage data are reported at the state level; usage data at smaller levels may not be statistically valid due to reduced sample size. Extent and variability of usage at the state level are presented using minimum, maximum, and average percent crop treated (PCT) over the five-year observation period. PCT is calculated as the percent of the acres grown for a crop that are treated with chlorpyrifos. Additionally, the data may inform assumptions about crops and states where chlorpyrifos is likely not being used, by identifying crops that are surveyed for but where usage is not observed during the observation period. The state level estimates of pesticide usage presented here (especially PCT) can be used to inform estimates of the proportion of a species range that may be exposed to chlorpyrifos.

The pesticide usage data summarized herein were obtained from both public and private (proprietary) sources. As presented, the data are not proprietary, business confidential, or a trade secret. The most recent five years of available data were used, 2011-2015, in order to represent current usage and the most recent use trend.

Data Sources

- **Agricultural Market Research Data (AMRD)** – proprietary pesticide usage data from 1998 to 2015 for historical use trend and 2011 to 2015 for current usage estimates. These data are collected and sold by a private market research firm. The data are collected by annual surveys of agricultural users in the continental United States and provides pesticide usage data for about 60 crops, including both specialty and row crops. The survey design targets at least 80 percent of US acreage/production of the surveyed commodities. Survey methodology provides statistically valid results, typically at the state level.
- **United States Department of Agriculture's National Agricultural Statistics Service (NASS)** – publicly available pesticide usage data from 2011 to 2015. NASS data are based on surveys that focus on the top-producing states that together account for the majority of U.S. acres or production of the surveyed commodity. NASS survey design targets a minimum of 80 percent of the acreage/production for every fruit, vegetable, and field crop surveyed. Operation level data are

combined during summary and, pending compliance with disclosure rules, published at the state and national levels. NASS does not collect data annually for each crop, but surveys for various commodities on a rotating schedule.

- **California Department of Pesticide Regulation (CADPR) Pesticide Use Reporting (PUR)** – publicly available pesticide usage data for 2011 to 2015. The PUR database contains detailed records and summaries of agricultural applications of pesticides on crops based on application permits. All agricultural growers must submit their production agricultural pesticide use reports monthly and pest control businesses must submit pesticide use reports within 7 days after their application. As such, CADPR data is a census of all usage rather than a survey and is published annually.
- **Non-Agricultural Market Research Data (NMRD)** - Proprietary data source that provides market data for agrochemicals/specialty pesticides for various market sectors, including professional turf and ornamental plants, professional pest control, consumer pesticides, and vegetation management. Market reports reflect usage by class/market segment and chemical and are based on sales information (manufacturer and retail) and end-user surveys. Study dates vary by market sector.

The presented usage data are averaged over the number of years of available survey data based on sampling frequency (five years for AMRD and CADPR, and 1-2 years for NASS and NMRD), regardless of whether usage is observed in each surveyed year. The presented data may thus underestimate the maximum yearly usage. In certain cases, data are unavailable or withheld. These cases are specified in the tables as follows:

- Some data sources do not provide all data elements. When a data element is not available this is indicated with a “--” notation in the relevant column.
- In some cases, not enough samples are available to establish a robust average. This is indicated with the notation “Insufficient number of reports to establish an estimate” or “(S)”. Generally, this indicates that the chemical is only periodically used by a small number of users.
- If a registered use site is surveyed by one of our data sources but no usage is observed, this is indicated with the notation “Surveyed but no usage reported” across the data columns. Lack of reported usage data for the pesticide on a surveyed crop indicates that there is a very low likelihood that the given pesticide is used on that crop.
- If a registered use site is not surveyed nationally by any of our data sources, this is indicated with the notation “Not Surveyed at National Level” across the data columns.

Summary

Nationally, among surveyed crops, agricultural chlorpyrifos usage has shown an overall decreasing trend in pounds applied since at least 2000. In contrast acres treated has increased slightly during that time period. Since 2008, however, both pounds applied and acres treated have been declining. Total agricultural acres treated with chlorpyrifos has decreased by 31%, and annual pounds applied agriculturally has decreased 42% since the 2008 peak. (Figure 1). During the most recent five years of available survey data (2011 - 2015), over 5.8 million pounds of chlorpyrifos were applied to nearly 9.5 million acres of agricultural crops annually (Table 1), in 40 states (Table 2). Approximately 50% of pounds of chlorpyrifos applied agriculturally are made to four crops (soybeans, alfalfa, wheat, and field corn). In terms of total acres treated, approximately 75% of the acres treated with chlorpyrifos are planted with the same three crops (soybeans, alfalfa, wheat, and field corn). The remaining 4 chlorpyrifos applications are spread over 30 other crops. Further information on national usage of chlorpyrifos by crop is available in Table 1. While the vast majority of chlorpyrifos is only applied to a handful of crops, examination of the percent of individual crops grown by state that are treated with chlorpyrifos indicates that it is an important pest control tool for certain crops in certain states. For instance, an average of 93% of onions in New

York, 93% of sugar beets in California, and 84% of peaches in South Carolina were treated with chlorpyrifos annually. Some crops display high average percent crop treated across states. For instance, over half of apple growing acres in many states (Virginia, Pennsylvania, Michigan, North Carolina, New York, West Virginia, and Washington) are treated with chlorpyrifos. Further information on percent of crops treated with chlorpyrifos by state is available in Table 2.

National non-agricultural usage data is more limited than agricultural data. However, available survey data indicates that much less chlorpyrifos was applied annually in the non-agricultural market than the agricultural market. During the survey period, over 150 thousand pounds of chlorpyrifos were applied annually to approximately 1.2 million acres of non-agricultural sites including buildings, ornamentals, turf, and wide areas for mosquito control. While the vast majority (88%) of the recorded acres treated with chlorpyrifos were for mosquito control, this sector only accounts for only 7% of pound applied, due to the low application rate of 0.01 lb/acre. Applications rates to ornamentals and turf are much more in line with agricultural use rates. Further information on non-agricultural sites treated with chlorpyrifos is available in (Table 3).

Chlorpyrifos SIAB Use and Usage Matrix

Chlorpyrifos is an insecticide registered for use on the sites listed in the tables below. The following document presents a summary of the use and usage data that is available to the Agency on this active ingredient, during the years listed.

Agricultural Usage

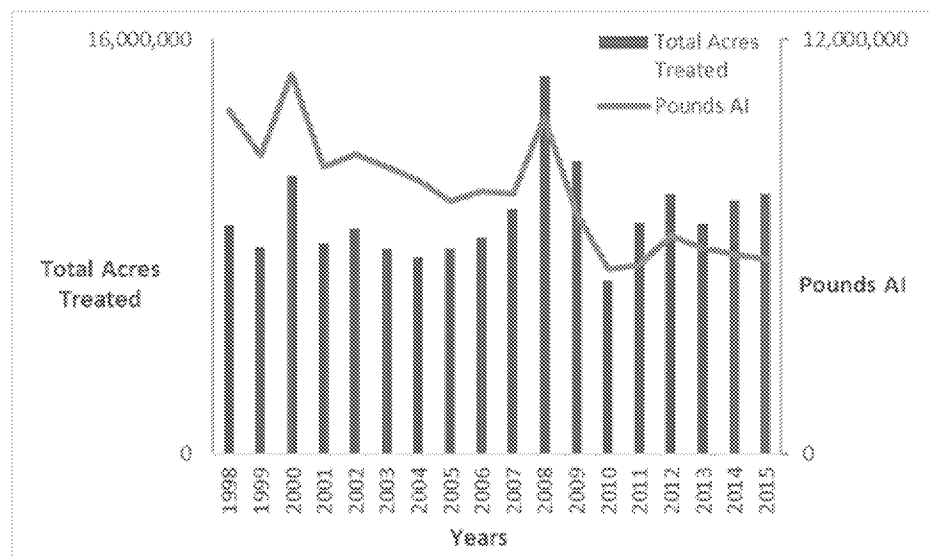


Figure 1. Chlorpyrifos Total Acres Treated and Total Pounds A.I. Applied (1998-2015).

(Does not include crops surveyed only by NASS and CADPR, as indicated in Table 1)

Source: Market Research Data (MRD). 1998-2015

Table 1. National Chlorpyrifos Agricultural Usage and Use by Crop. Data Averaged Over Reported Years.

Crop	Data Source	States with Reported Usage	Avg. Annual Pounds AI Applied ^a	Avg. Annual Total Acres Treated ^b	% Applied by Air	Avg. Single AI Rate	Max Single Labeled Rate lb/a ^c
Root and Tuber Vegetables	See individual crops below						Full Crop Group Not Registered
Sugar Beets	AMRD (2011-2015)	CA, CO, ID, MI, MN, MT, NE, ND, WY	156,789	229,116	17%	0.684	2.0
Carrots (Grown for Seed)	AMRD (2011-2015)	Surveyed but no usage reported					0.9
Beets (Garden/Table)	Not Surveyed at National Level						1.9
Ginseng (Medical)	Not Surveyed at National Level						2.0 (MI and WI only)
Radish	Not Surveyed at National Level						3.0
Rutabaga	Not Surveyed at National Level						2.4
Sweet Potato	Not Surveyed at National Level						2.1
Turnips	Not Surveyed at National Level						2.3

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Crop	Data Source	States with Reported Usage	Avg. Annual Pounds AI Applied ^a	Avg. Annual Total Acres Treated ^b	% Applied by Air	Avg. Single AI Rate	Max Single Labeled Rate lb/a ^c
Bulb Vegetables	See individual crops below						Full Crop Group Not Registered
Onions	AMRD (2011-2015)	CA, CO, GA, ID, NY, OR, TX, WA	53,732	57,562	0%	0.933	1.0
Cole Crops	See individual crops below						Full Crop Group Not Registered
Cole Crops (excluding Cauliflower and Brussels Sprouts)	See individual crops below						2.0
Cabbage	AMRD (2011-2015)	CA, CO, FL, GA, MI, NY, NC	6,913	6,455	0%	1.071	2.0
Broccoli*	CADPR (2011-2015)	CA	11,013	8,356	4%	1.318	2.0
Other Cole Crops	Not Surveyed at National Level						2.0
Brussels Sprouts*	CADPR (2011-2015)	CA	1,242	1,369	100%	0.907	2.3
Cauliflower*	CADPR (2011-2015)	CA	1,989	1,841	1%	1.081	2.3
Legume Vegetables	See individual crops below						2.2 (Soybeans) 1.0 (All Others)
Dry Beans/Peas	AMRD (2011-2015)	CA, ID, MI, MN, MT, ND, WA, WY	7,858	17,302	4%	0.454	1.0
Beans (Snap, Bush, Pole, String)	AMRD (2011-2015)	CA, FL, OR, TX	3,944	4,555	10%	0.866	1.0
Peas (Fresh/Green/Sweet)	AMRD (2011-2015)	OR	Insufficient number of reports to establish an estimate.				1.0
Soybeans	AMRD (2011-2015)	AL, GA, IL, IN, IO, KS, MI, MN, MO, NE, ND, OH, PA, SC, SD, WI	1,162,212	3,417,480	30%	0.340	2.2
Fruiting Vegetables	See individual crops below						Full Crop Group Not Registered
Peppers	AMRD (2011-2015)	AZ, FL, TX	Insufficient number of reports to establish an estimate.				1.0
Cucurbit Vegetables	See individual crops below						Full Crop Group Not Registered
Cucumbers	Not Surveyed at National Level						(seed only)
Pumpkins	Not Surveyed at National Level						(seed only)

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Crop	Data Source	States with Reported Usage	Avg. Annual Pounds AI Applied ^a	Avg. Annual Total Acres Treated ^b	% Applied by Air	Avg. Single AI Rate	Max Single Labeled Rate lb/a ^c
Fruit and Nut Trees (Bearing)	See individual crops below						Full Crop Group Not Registered Rates or bearing trees (Non-bearing trees max rate = 4.0)
Almonds*	CADPR (2011-2015)	CA	283,176	153,764	25%	1.842	4.0
Apples	AMRD (2011-2015)	CA, MI, NY, NC, OH, OR, PA, VA, WA, WV	334,217	214,871	2%	1.555	2.0
Cherries	AMRD (2011-2015)	CA, MI, OR, WA	76,074	51,030	0%	1.491	4.0 (tart cherry) 2.5 (sweet cherry)
Citrus	See individual crops below						6.0
Grapefruit	AMRD (2011-2015)	FL, TX	77,072	34,790	2%	2.215	6.0
Lemons*	CADPR (2011-2015)	CA	28,773	9,262	0.03%	3.106	6.0
Oranges	AMRD (2011-2015)	CA, FL	413,761	195,226	10%	2.119	6.0
Tangelos	NASS (2011, 2015)	FL	800	--	--	1.459	6.0
Tangerines	NASS (2011, 2015)	CA, FL	22,800	--	--	1.298	6.0
Figs*	CADPR (2011-2015)	CA	Surveyed but no usage reported				2.0
Hazelnuts	AMRD (2011-2015)	OR	4,174	3,810	7%	1.095	2.0
Nectarines*	CADPR (2011-2015)	CA	2,200	1,492	100%	1.475	3.0
Peaches	AMRD (2011-2015)	AL, CA, GA, IL, MI, NJ, NY, PA, SC, TX	41,894	36,872	1%	1.136	3.0
Pears	AMRD (2011-2015)	WA, OR, WA	15,558	7,883	1%	1.974	2.0
Pecans	AMRD (2011-2015)	AL, GA, LA, NM, OK, TX	157,280	174,033	12%	0.904	4.3
Plums/Prunes*	CADPR (2011-2015)	CA	1,899	1,065	0%	1.784	2.5
Walnuts	AMRD (2011-2015)	CA	368,437	193,183	4%	1.907	4.0
Pineapple	Not Surveyed at National Level						2.0

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Crop	Data Source	States with Reported Usage	Avg. Annual Pounds AI Applied ^a	Avg. Annual Total Acres Treated ^b	% Applied by Air	Avg. Single AI Rate	Max Single Labeled Rate lb/a ^c
Berries and Small Fruit	See individual crops below						Full Crop Group Not Registered
Grapes*	CADPR (2011-2015)	CA	92,862	51,445	0.02%	1.805	2.25 (east of the continental divide, CO, ID, and WA); 2.0 (CA)
Strawberries	AMRD (2011-2015)	CA, FL, MI, NY, OR, PA	7,544	7,452	0%	1.012	2.0
Cranberries	Not Surveyed at National Level						1.5
Cereal Grains	See individual crops below						Full Crop Group Not Registered
Corn	See individual crops below						3.0
Field Corn	AMRD (2011-2015)	CA, CO, GA, ID, IL, IN, IO, KS, KY, MI, MN, MO, NE, NM, NY, ND, OH, OK, PA, SD, TN, TX, VA, WI	594,211	789,680	24%	0.752	3.0
Sweet Corn	AMRD (2011-2015)	CA, FL, GA, IL, MI, MN, NJ, NY, OH, OR, PA, WA, WI	65,680	66,775	21%	0.984	3.0
Pop Corn	Not Surveyed at National Level						3.0
Sorghum (Milo)	AMRD (2011-2015)	AR, CO, GA, KS, LA, MO, NM, OK, SD, TX	44,777	102,278	46%	0.456	3.3
Wheat	See individual crops below						4.0
Wheat, Spring	AMRD (2011-2015)	AZ, CA, ID, MN, MT, ND, OR, SD, WA	330,468	960,882	16%	0.344	4.0
Wheat, Winter	AMRD (2011-2015)	CA, CO, IL, IN, KS, MO, MT, NM, NC, ND, OH, OK, OR, SD, TX, VA, WA	290,304	759,353	15%	0.382	4.0
Triticale	Not Surveyed at National Level						(seed only)
Grass Forage/Fodder/Hay	AMRD (2011-2015)	Surveyed but no usage reported					1.0

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Crop	Data Source	States with Reported Usage	Avg. Annual Pounds AI Applied ^a	Avg. Annual Total Acres Treated ^b	% Applied by Air	Avg. Single AI Rate	Max Single Labeled Rate lb/a ^c
Non-Grass Animal Feeds	See individual crops below						Full Crop Group Not Registered
Alfalfa	AMRD (2011-2015)	AZ, CA, CO, ID, IL, IN, IO, KS, KY, MI, MN, MO, MT, NE, NV, NM, MO, NE, NV, NM, ND, OH, OK, OR, PA, SD, TX, UT, VA, WA, WI, WY	643,078	1,259,991	21%	0.510	1.0
Clover (Grown for Seed)	Not Surveyed at National Level						1.9
Oil Seed Group	See individual crops below						Full Crop Group Not Registered
Cotton	AMRD (2011-2015)	AL, AZ, CA, GA, KS, LA, TX	67,816	218,923	13%	0.310	1.0
Sunflowers	AMRD (2011-2015)	CO, KS, MN, NE, ND, SD, TX	67,352	194,760	64%	0.346	2.0
Stalk, Stem, and Leaf Petiole Vegetable Group	See individual crops below						Full Crop Group Not Registered
Asparagus	AMRD (2011-2015)	CA, MI, WA	18,194	20,881	15%	0.871	1.5

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Crop	Data Source	States with Reported Usage	Avg. Annual Pounds AI Applied ^a	Avg. Annual Total Acres Treated ^b	% Applied by Air	Avg. Single AI Rate	Max Single Labeled Rate lb/a ^c
Misc Crops	See individual crops below						Full Crop Group Not Registered
Peanuts	AMRD (2011-2015)	AL, FL, GA, NC, SC, TX, VA	197,640	107,969	1%	1.831	4.0
Tobacco	AMRD (2011-2015)	GA, KY, NC, OH, PA, SC, TN, VA	46,334	38,969	0%	1.189	2.0
Mint (Peppermint and Spearmint)	Not Surveyed at National Level						2.0

Notes	
AMRD (YEAR-YEAR)	Agricultural usage surveyed by market research firm(s)
NASS (YEAR)	Surveyed by United States Department of Agriculture National Agricultural Statistics Service
CADPR (YEAR)	Surveyed by the California Department of Pesticide Regulation. Over than 80% of crop grown in California. California usage is considered to be representative of National usage for these crops.
^a	The pounds AI displayed in this document may differ from those displayed in the SLUA and other BEAD documents, because different calculation methods were used.
^b	Total Acres Treated accounts for multiple applications to a single area. This may overestimate the number of acres treated as some acres are treated more than once.
^c	Max labeled rate from APPENDIX 1-3. CYP Master Use Table

Table 2. Chlorpyrifos Agricultural Usage and Use by Crop and State.

Crop	Data Source	State	Avg. Annual Crop Acres Grown ¹	Avg. Annual Total Lbs. AI Applied	Min. Annual PCT	Max. Annual PCT	Avg. Annual PCT
Root and Tuber Vegetables	See Individual Crops Below						
Sugar Beets	AMRD (2011 - 2015)	California	24,800	26,688	72	100	93
		Colorado	5,860	(S)	0	2	0
		Idaho	174,800	76,191	18	79	53
		Michigan	152,200	4,915	1	9	5
		Minnesota	462,202	14,662	2	8	5
		Montana	9,300	(S)	0	1	0
		Nebraska	10,200	(S)	0	12	2
		North Dakota	224,198	33,839	8	26	17
Wyoming	6,260	(S)	0	8	2		
Beets (Garden/Table)	CADPR (2011-2015)	California (21%)	2,730	(S)	0	0.04	11
Carrots (Grown for Seed)	AMRD (2011 - 2015)	Surveyed but no usage reported					
Ginseng (Medical)	Not Surveyed at National Level						
Radish	CADPR (2011-2015)	California (13%)	1,926	1,098	1	4	2
Rutabaga	CADPR (2011-2015)	California (5%)	Surveyed but no usage reported				
Sweet Potato	CADPR (2011-2015)	California (15%)	18,189	2,141	6	15	9
Turnips	CADPR (2011-2015)	California (9%)	386	45	0.3	1	1
Bulb Vegetables	See Individual Crops Below						
Onions	AMRD (2011 - 2015)	California	45,140	8,340	11	28	20
		Colorado	2,800	(S)	0	45	10
		Georgia	12,660	7,169	31	94	64
		Idaho	8,360	4,331	4	84	49
		New York	8,900	8,638	81	100	93
		Oregon	19,660	11,850	16	81	62
		Texas	2,720	(S)	0	13	3
		Washington	23,880	12,221	30	80	50
Cole Crops	See Individual Crops Below						
Cole Crops (excluding Cauliflower and Brussels Sprouts)	See Individual Crops Below						
Broccoli*	CADPR (2011-2015)	California (81)	104,268	11,013	0.105	2	1

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Crop	Data Source	State	Avg. Annual Crop Acres Grown [†]	Avg. Annual Total Lbs. AI Applied	Min. Annual PCT	Max. Annual PCT	Avg. Annual PCT
Cabbage	AMRD (2011 - 2015)	California	13,280	4,505	2	60	30
		Colorado	500	(S)	0	100	20
		Florida	3,960	(S)	0	9	2
		Georgia	1,080	(S)	0	7	1
		Michigan	1,920	1,119	0	85	37
		New York	6,080	132	0	3	1
		North Carolina	2,900	(S)	0	25	8
Gai Lon (Chinese Broccoli)	CADPR (2011-2015)	California (--%)	--	(S)	2	9	4
Napa Cabbage	CADPR (2011-2015)	California (--%)	--	240	0.3	1	0.5
Boy Choy	CADPR (2011-2015)	California (--%)	--	379	0.1	1	0.5
Collards	CADPR (2011-2015)	California (5%)	633	96	1	3	2
Kale	CADPR (2011-2015)	California (27%)	4,671	237	0.1	1	0.4
Kohlrabi	CADPR (2011-2015)	California (--%)	--	(S)	0	0.08	0.02
Mustard Greens	CADPR (2011-2015)	California (11%)	Surveyed but no usage reported				
Mizuna	CADPR (2011-2015)	California (--%)	Surveyed but no usage reported				
Other Cole Crops	Not Surveyed at National Level						
Brussels Sprouts*	CADPR (2011-2015)	California (96%)	7,299	1,242	1	12	4
Cauliflower*	CADPR (2011-2015)	California (82%)	34,369	1,989	0.001	1	1
Legume Vegetables	See Individual Crops Below						
Dry Beans/Peas	AMRD (2011 - 2015)	California	19,200	748	0	7	2
		Idaho	85,800	(S)	0	1	0
		Michigan	130,000	(S)	0	2	1
		Minnesota	57,000	(S)	0	1	0
		Montana	113,841	(S)	0	0	0
		North Dakota	659,797	2,895	0	2	1
		Washington	110,000	(S)	0	9	2
		Wyoming	6,600	(S)	0	23	5
Beans (Snap, Bush, Pole, String)	AMRD (2011 - 2015)	California	1,912	(S)	0	47	9
		Florida	9,356	(S)	0	5	1
		Oregon	13,163	2,348	15	26	20
		Texas	679	(S)	0	82	16
Peas (Fresh/Green/Sweet)	AMRD (2011 - 2015)	Oregon	7,020	(S)	0	4	1

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Crop	Data Source	State	Avg. Annual Crop Acres Grown [†]	Avg. Annual Total Lbs. AI Applied	Min. Annual PCT	Max. Annual PCT	Avg. Annual PCT
Soybeans	AMRD (2011 - 2015)	Alabama	84,000	(S)	0	1	0
		Georgia	108,000	4,843	0	20	6
		Illinois	7,400,003	56,500	0	4	2
		Indiana	5,350,001	142,570	1	9	5
		Iowa	9,660,008	169,391	3	9	6
		Kansas	2,229,999	3,589	0	1	0
		Michigan	1,590,000	23,946	0	7	2
		Minnesota	7,220,001	334,278	10	16	13
		Missouri	3,220,001	24,015	0	2	0
		Nebraska	5,049,999	58,397	1	7	3
		North Dakota	4,990,002	240,678	7	35	17
		Ohio	2,769,996	15,387	0	2	1
		Pennsylvania	106,000	(S)	0	3	1
		South Carolina	164,000	(S)	0	5	1
		South Dakota	4,669,999	64,154	1	11	5
		Wisconsin	1,414,001	21,446	0	16	4
Fruiting Vegetables		See Individual Crops Below					
Peppers	AMRD (2011 - 2015)	Arizona	280	(S)	0	45	9
		Florida	3,760	(S)	0	1	0
		Texas	720	(S)	0	5	1
Cucurbit Vegetables		See Individual Crops Below					
Cucumbers	AMRD (2011 - 2015)	California	1,941	(S)	0	0	0
		Florida	5,440	(S)	0	4	1
		South Carolina	800	(S)	0	64	13
		Texas	2,020	(S)	0	10	3
Pumpkins	AMRD (2011 - 2015)	Massachusetts	407	263	0	67	13
		Missouri	572	(S)	0	72	23
		New Mexico	806	(S)	0	76	15
		New York	3,660	(S)	0	4	1
		Oregon	406	(S)	0	11	2
		Pennsylvania	2,800	(S)	0	12	3
		Washington	394	(S)	0	28	6
		Wisconsin	2,534	(S)	0	4	2
Fruit and Nut Trees		See Individual Crops Below					
Almonds*	CADPR (2011-2015)	California (100%)	935,804	283,176	8	18	12

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Crop	Data Source	State	Avg. Annual Crop Acres Grown [†]	Avg. Annual Total Lbs. AI Applied	Min. Annual PCT	Max. Annual PCT	Avg. Annual PCT
Apples	AMRD (2011 - 2015)	California	18,303	5,032	3	41	15
		Michigan	43,282	39,109	66	81	73
		New York	48,366	50,631	52	84	71
		North Carolina	5,850	6,010	55	90	73
		Ohio	4,709	2,008	36	43	40
		Oregon	5,471	1,806	1	40	17
		Pennsylvania	23,416	29,666	64	88	75
		Virginia	12,827	15,507	60	92	80
		Washington	163,924	180,344	49	68	57
		West Virginia	3,723	4,102	0	89	62
Apricots	AMRD (2011 - 2015)	California	2,158	(S)	0	5	1
Cherries	AMRD (2011 - 2015)	California	29,805	1,700	0	7	3
		Michigan	45,911	20,846	24	60	39
		Oregon	17,037	16,804	33	67	47
		Washington	42,192	36,725	41	58	48
Citrus	<i>See Individual Crops Below</i>						
Grapefruit	AMRD (2011 - 2015)	Florida	52,411	53,878	32	61	44
		Texas	18,314	23,194	5	89	35
Lemons*	CADPR (2011-2015)	California (80%)	49,631	28,773	13	22	18
Oranges	AMRD (2011 - 2015)	California	191,650	183,378	17	36	26
		Florida	481,814	230,383	17	30	23
Tangelos	NASS (2011, 2015)	Florida	800	800	(D)	7	7
Tangerines	NASS (2011, 2015)	California	33,465	21,950	19	24	22
		Florida	8,122	850	5	6	6
Figs*	CADPR (2011-2015)	California (96%)	6,787	Surveyed but no usage reported			
Hazelnuts	AMRD (2011 - 2015)	Oregon	35,343	4,174	8	12	10
Nectarines*	CADPR (2011-2015)	California (87%)	19,555	2,200	2	8	6

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Crop	Data Source	State	Avg. Annual Crop Acres Grown [†]	Avg. Annual Total Lbs. AI Applied	Min. Annual PCT	Max. Annual PCT	Avg. Annual PCT
Peaches	AMRD (2011 - 2015)	Alabama	2,274	1,728	35	100	66
		California	52,541	3,288	2	5	3
		Georgia	10,485	7,234	0	63	34
		Illinois	720	419	0	70	23
		Michigan	4,146	1,007	4	30	11
		New Jersey	3,256	3,387	0	83	25
		New York	361	(S)	0	4	1
		Pennsylvania	5,025	1,676	2	50	22
		South Carolina	17,999	18,064	68	95	84
		Texas	5,062	2,465	6	60	32
		Washington	2,633	2,613	10	90	50
Pears	AMRD (2011 - 2015)	California	7,599	1,930	0	16	6
		Oregon	17,144	1,548	2	11	4
		Washington	22,993	12,079	14	37	24
Pecans	AMRD (2011 - 2015)	Alabama	10,815	5,046	0	33	13
		Georgia	117,902	68,312	27	46	39
		Louisiana	3,243	(S)	0	59	12
		New Mexico	40,079	13,944	7	55	26
		Oklahoma	126,728	4,867	2	6	4
		Texas	170,910	61,317	19	38	27
Plums*	CADPR (2011-2015)	California (94%)	21,616	1,142	1	3	4
Prunes*	CADPR (2011-2015)	California (94%)	61,295	757	0	2	1
Walnuts	AMRD (2011 - 2015)	California	314,967	368,437	32	47	42
Pineapple	Not Surveyed at National Level						
Berries and Small Fruit	See Individual Crops Below						
Grapes*	CADPR (2011-2015)	California (83%)	940,178	92,862	6	16	12
Strawberries	AMRD (2011 - 2015)	California	31,420	6,179	0	31	16
		Florida	3,560	(S)	0	7	2
		Michigan	660	282	0	49	23
		New York	1,200	253	0	29	15
		Oregon	2,100	699	9	29	22
		Pennsylvania	348	(S)	0	10	3
Cranberries	Not Surveyed at National Level						

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Crop	Data Source	State	Avg. Annual Crop Acres Grown [†]	Avg. Annual Total Lbs. AI Applied	Min. Annual PCT	Max. Annual PCT	Avg. Annual PCT
Cereal Grains	See Individual Crops Below						
Corn	See Individual Crops Below						
Field Corn	AMRD (2011 - 2015)	California	244,001	(S)	0	2	1
		Colorado	504,000	(S)	0	5	1
		Georgia	239,000	10,210	0	14	8
		Idaho	146,000	(S)	0	13	4
		Illinois	12,300,006	151,554	1	2	1
		Indiana	5,980,002	47,949	0	2	1
		Iowa	13,899,998	68,228	0	1	1
		Kansas	3,590,000	52,146	0	8	2
		Kentucky	1,198,000	4,496	0	1	0
		Michigan	2,599,999	39,532	0	3	1
		Minnesota	8,439,999	35,157	0	1	1
		Missouri	2,680,000	4,946	0	1	1
		Nebraska	9,740,001	34,208	0	1	0
		New Mexico	25,000	(S)	0	2	0
		New York	896,000	(S)	0	5	1
		North Dakota	779,998	(S)	0	0	0
		Ohio	3,710,002	29,542	0	1	1
		Oklahoma	140,000	(S)	0	12	3
		Pennsylvania	1,460,001	24,283	1	3	2
		South Dakota	2,079,999	(S)	0	3	1
		Tennessee	186,000	(S)	0	1	0
		Texas	480,000	(S)	0	0	0
		Virginia	396,000	8,216	0	3	2
		Wisconsin	4,199,999	33,323	1	1	1
Sweet Corn	AMRD (2011 - 2015)	California	32,680	8,814	9	34	21
		Florida	36,000	15,451	0	82	36
		Georgia	5,600	(S)	0	10	2
		Illinois	10,928	924	0	28	7
		Michigan	7,880	362	0	20	5
		Minnesota	124,180	1,365	1	3	1
		New Jersey	4,717	688	0	24	11
		New York	32,891	3,637	2	14	10
		Ohio	16,020	5,887	6	48	29
		Oregon	23,642	14,997	44	73	57
		Pennsylvania	14,731	6,366	20	52	35
		Washington	37,160	4,336	0	14	4
		Wisconsin	78,260	2,282	0	11	4
Pop Corn	Not Surveyed at National Level						

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Crop	Data Source	State	Avg. Annual Crop Acres Grown [†]	Avg. Annual Total Lbs. AI Applied	Min. Annual PCT	Max. Annual PCT	Avg. Annual PCT
Sorghum (Milo)	AMRD (2011 - 2015)	Arkansas	100,000	(S)	0	7	1
		Colorado	128,999	(S)	0	0	0
		Georgia	27,000	(S)	0	17	5
		Kansas	2,850,001	6,387	0	1	0
		Louisiana	86,000	8,316	0	53	13
		Missouri	49,000	1,470	0	15	3
		New Mexico	25,000	(S)	0	1	0
		Oklahoma	148,001	4,195	0	6	2
		South Dakota	40,000	(S)	0	1	0
		Texas	2,509,996	20,504	1	3	2
Wheat	<i>See Individual Crops Below</i>						
Wheat, Spring	AMRD (2011 - 2015)	Arizona	14,000	(S)	0	3	1
		California	26,000	(S)	0	4	1
		Idaho	239,601	(S)	0	3	1
		Minnesota	1,414,001	27,926	1	9	5
		Montana	1,933,991	1,989	0	1	0
		North Dakota	6,948,004	263,161	7	14	12
		Oregon	20,000	(S)	0	2	1
		South Dakota	1,068,400	2,753	0	1	1
		Washington	124,000	(S)	0	0	0
Wheat, Winter	AMRD (2011 - 2015)	California	310,000	4,906	0	6	1
		Colorado	2,490,002	48,351	0	9	5
		Idaho	152,000	(S)	0	0	0
		Illinois	152,000	(S)	0	1	0
		Kansas	5,559,996	33,681	0	3	1
		Missouri	350,000	(S)	0	0	0
		Montana	460,001	(S)	0	2	0
		New Mexico	162,000	(S)	0	35	7
		North Carolina	166,000	(S)	0	0	0
		North Dakota	508,000	52,613	0	44	24
		Ohio	114,000	(S)	0	1	0
		Oklahoma	5,360,003	33,191	1	4	1
		Oregon	299,999	(S)	0	2	1
		South Dakota	330,000	(S)	0	1	0
		Texas	5,830,003	94,288	3	10	5
		Virginia	176,000	(S)	0	2	1
		Washington	332,000	(S)	0	0	0
Triticale	Not Surveyed at National Level						
Grass Forage/Fodder/Hay	AMRD (2011 - 2015)	Surveyed but no usage reported					

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Crop	Data Source	State	Avg. Annual Crop Acres Grown [†]	Avg. Annual Total Lbs. AI Applied	Min. Annual PCT	Max. Annual PCT	Avg. Annual PCT
Non-Grass Animal Feeds	See Individual Crops Below						
Alfalfa	AMRD (2011 - 2015)	Arizona	206,000	8,469	0	11	6
		California	718,000	89,673	0	50	20
		Colorado	742,001	29,470	5	13	8
		Idaho	1,056,001	37,446	3	11	6
		Illinois	130,000	(S)	0	3	1
		Indiana	56,000	(S)	0	10	2
		Iowa	756,000	5,507	0	2	1
		Kansas	640,000	127,225	28	40	35
		Kentucky	121,000	(S)	0	6	2
		Michigan	254,000	6,855	0	4	1
		Minnesota	1,016,000	16,845	1	5	3
		Missouri	250,000	18,479	1	21	11
		Montana	1,110,000	3,979	0	2	1
		Nebraska	468,000	14,119	0	10	3
		Nevada	251,000	11,179	1	17	9
		New Mexico	212,000	20,301	3	28	15
		North Dakota	1,198,000	33,152	0	8	4
		Ohio	264,000	2,633	0	7	2
		Oklahoma	259,999	100,502	40	67	54
		Oregon	310,000	9,832	0	12	5
		Pennsylvania	326,000	4,047	0	6	2
		South Dakota	2,010,001	6,199	0	3	1
		Texas	70,000	(S)	0	58	16
		Utah	537,999	30,228	10	16	13
		Virginia	14,000	(S)	0	2	0
		Washington	252,000	4,874	0	10	3
		Wisconsin	946,000	4,212	0	2	1
		Wyoming	520,000	27,944	4	17	9
Clover (Grown for Seed)	Not Surveyed at National Level						
Oil Seed Group	See Individual Crops Below						
Cotton	AMRD (2011 - 2015)	Alabama	71,000	(S)	0	2	1
		Arizona	124,000	1,861	0	4	2
		California	204,799	26,993	0	24	12
		Georgia	773,999	32,339	0	16	6
		Kansas	11,400	(S)	0	5	2
		Louisiana	93,001	(S)	0	1	0
		Texas	5,270,810	(S)	0	1	0

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Crop	Data Source	State	Avg. Annual Crop Acres Grown [†]	Avg. Annual Total Lbs. AI Applied	Min. Annual PCT	Max. Annual PCT	Avg. Annual PCT
Sunflowers	AMRD (2011 - 2015)	Colorado	83,900	2,449	2	30	11
		Kansas	86,800	16,933	17	54	32
		Minnesota	55,800	4,064	3	26	13
		Nebraska	27,200	(S)	0	16	5
		North Dakota	670,804	24,283	5	20	12
		South Dakota	525,597	13,909	0	8	4
		Texas	79,001	5,140	0	32	13
Stalk, Stem, and Leaf Petiole Vegetable Group	See Individual Crops Below						
Asparagus	AMRD (2011 - 2015)	California	11,760	10,444	34	89	65
		Michigan	10,260	7,152	53	72	63
		Washington	1,300	(S)	0	32	6
Misc Crops	See Individual Crops Below						
Peanuts	AMRD (2011 - 2015)	Alabama	69,000	(S)	0	11	3
		Florida	168,000	9,348	0	11	3
		Georgia	597,999	153,545	5	18	14
		North Carolina	90,200	17,777	6	20	11
		South Carolina	18,000	(S)	0	1	0
		Texas	81,400	3,788	0	9	2
		Virginia	18,000	3,926	2	24	11
Tobacco	AMRD (2011 - 2015)	Georgia	10,668	1,834	0	31	19
		Kentucky	86,552	1,653	0	3	2
		North Carolina	174,410	34,907	7	26	16
		Ohio	360	(S)	0	8	2
		Pennsylvania	7,574	4,223	0	79	33
		South Carolina	10,065	2,913	0	58	19
		Tennessee	5,479	(S)	0	2	0
		Virginia	20,085	653	0	6	3
Mint (Peppermint and Spearmint)	CADPR (2011-2015)	California (3%)	3,037	(S)	0	0.03	0.01

Notes	
AMRD (YEAR-YEAR)	Surveyed by MRD Data, and Year(s) of data included
NASS (YEAR)	Surveyed by NASS, and Year(s) of data included
CADPR (YEAR)	Surveyed by CADPR and Year(s) of data included. Percent of crop grown in California included under state. Crops with reported CADPR data, but less than 80% of crop grown in California, are grown in other states, but other survey data is unavailable.
*	California crop. Over than 80% of crop grown in California. California usage is considered to be representative of National usage for these
a	The pounds AI displayed in this document may differ from those displayed in the SLUA and other BEAD documents, because different calculation methods were used.
c	Max labeled rate from APPENDIX 1-3. CYP Master Use Table
(S)	Insufficient number of reports to establish an estimate. This indicates that the chemical is only periodically used by a small number of users.
†	CAG represents the total number of acres that are grown of the crop in each state. It is independent of treatment with any pesticide

Non-Agricultural Usage

Table 3. National Chlorpyrifos Non-Agricultural Usage and Use by Crop. Data Averaged Over Reported Years.

Use Site/Geographic Area ^d	Data Source	Avg. Annual Pounds AI Applied ^a	% of market by weight ^c	Avg. Annual Total Acres Treated ^b	Max Single Labeled Rate ^c
ALL Ornamental Lawns and Turf, Sod Farms (Turf)	NMRD (2012)	142,000	6.5% (6 th highest)	--	6.0 lb/a (woody shrubs/vines) 4.0 lb/a (nursery stock) 3.0 lb/a (herbaceous plants/ornamental trees) 0.007 lb/gal (non-flowering) 3.76 (turf)
Nursery/Greenhouse	NMRD (2012)	47,318	8.3% (2 nd highest)	6,860	6.0 lb/a (woody shrubs/vines) 4.0 lb/a (nursery stock) 3.0 lb/a (herbaceous plants/ornamental trees) 0.007 lb/gal (non-flowering)
Deep South	NMRD (2012)	8,000	--	13,150	(see above)
North Central	NMRD (2012)	13,000	--	14,930	(see above)
Northeast	NMRD (2012)	9,000	--	24,700	(see above)
South	NMRD (2012)	15,000	--	11,810	(see above)
West	NMRD (2012)	2,000	--	2,260	(see above)
Turf Farms	NMRD (2012)	70,144	58% (1 st highest)	63,700	3.76 lb/a
Deep South	NMRD (2012)	56,000	--	50,430	3.76 lb/a
South	NMRD (2012)	11,000	--	6,790	3.76 lb/a
West	NMRD (2012)	3,000	--	6,480	3.76 lb/a

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Use Site/Geographic Area ^d	Data Source	Avg. Annual Pounds AI Applied ^a	% of market by weight ^e	Avg. Annual Total Acres Treated ^b	Max Single Labeled Rate ^c
Golf Course Turf	NMRD (2012)	21,872	4.8% (5th highest)	24,160	3.76 lb/a
Deep South	NMRD (2012)	6,000	--	3,800	3.76 lb/a
North Central	NMRD (2012)	3,000	--	3,150	3.76 lb/a
Northeast	NMRD (2012)	7,000	--	8,250	3.76 lb/a
South	NMRD (2012)	4,000	--	6,460	3.76 lb/a
West	NMRD (2012)	1,000	--	2,490	3.76 lb/a
In Institutional Turf Facilities	NMRD (2012)	308	0.2%	620	3.76 lb/a
West	NMRD (2012)	308	--	620	3.76 lb/a
Applied to Turf by Landscape Contractors	NMRD (2012)	39	0.05%	40	3.76 lb/a
Northeast	NMRD (2012)	39	--	40	3.76 lb/a
Applied to Turf by Lawn Care Operators	NMRD (2012)	2,773	0.4%	2,140	3.76 lb/a
South	NMRD (2012)	400	--	260	3.76 lb/a
West	NMRD (2012)	2,000	--	950	3.76 lb/a
Wide Area Treatments					
Mosquito Control; Household/ Domestic Dwellings Outdoor Premises; Recreational Areas	NMRD (2015)	10,944	0.50%	1,103,408	0.01 lb/a
North Central	NMRD (2015)	532	--	88,306	0.01 lb/a
South	NMRD (2015)	9,339	--	895,102	0.01 lb/a
West	NMRD (2015)	1,073	--	120,000	0.01 lb/a
Mosquito Control	NMRD (2012)	Surveyed but no usage reported			0.01 lb/a
Wide Area/ General Outdoor Treatment (for ants and other misc pests)	NMRD (2012)	Surveyed but no usage reported			0.5084 lb/100 gal

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Use Site/Geographic Area ^d	Data Source	Avg. Annual Pounds AI Applied ^a	% of market by weight ^e	Avg. Annual Total Acres Treated ^b	Max Single Labeled Rate ^c
Buildings/Premises					
Commercial/Institution-AI/ Industrial Premises/ Equip. (Indoor)	NMRD (2012)	Surveyed but no usage reported			0.4373 lb/100 sq ft, 190.5 lb/a (fire ants) 0.0625 lb/1,000 sq ft, 2.7 lb/a (general)
Commercial/Institutional /Industrial Premises/Equip. (Outdoor)	NMRD (2012)	Surveyed but no usage reported			0.1132 lb/1,000 sq ft, 4.9 lb/a
Nonagricultural Outdoor Buildings/Structures (non-residential)	NMRD (2012)	Surveyed but no usage reported			1.0 lb/a
Food Processing Plant Premises (Nonfood Contact)	NMRD (2014)	Surveyed but no usage reported			0.0424 lb/gal
Household/ Domestic Dwellings Indoor Premises	NMRD (2010, 2012)	Surveyed but no usage reported			0.0003 lb/bait station
Wood Protection Treatment to Buildings/ Products Outdoor	NMRD (2012)	Surveyed but no usage reported			16.65 lb/10,000 sq ft
Rights of Way/Utilities					
Rights of Way, Road Medians	NMRD (2011)	Surveyed but no usage reported			1.0 lb/a
Utilities	NMRD (2011)	Surveyed but no usage reported			0.44 lb/100 sq ft/ 1.0 lb/a
Sewer Manhole Covers and Walls	NMRD (2011)	Surveyed but no usage reported			0.31 lb/ manhole
Livestock Areas/Animals					
Agricultural Farm Premises (livestock housing and holding areas)	Not Surveyed at National Level				0.075 lb/1,000 sq ft, 1.2 lb/a
Poultry Litter	Not Surveyed at National Level				0.07126 a.i./1000 sq ft, 3.1 lb/a
Beef/Dairy Cattle	Not Surveyed at National Level				0.0066 lb/animal

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Use Site/Geographic Area ^d	Data Source	Avg. Annual Pounds AI Applied ^a	% of market by weight ^e	Avg. Annual Total Acres Treated ^b	Max Single Labeled Rate ^c
Trees					
Christmas Tree Plantations	NMRD (2011)	Surveyed but no usage reported			2.5 lb/a
Hybrid Cottonwood/ Poplar Plantations	NMRD (2011)	Surveyed but no usage reported			1.9 lb/a
Forest Plantings (Reforestation Programs) (Tree Farms, Tree Plantations, etc)	NMRD (2011)	Surveyed but no usage reported			1.0 lb/a
Conifers and Deciduous Trees; Plantation, Nursery	NMRD (2011)	Surveyed but no usage reported			1.0 lb/a
Forest Trees (Softwoods, Conifers)	NMRD (2011)	Surveyed but no usage reported			[3.6 lb/a] 2.4 lb a.i./100 gal

Notes	
NMRD (YEAR)	Nonagricultural usage surveyed by market research firms.
a	The pounds AI displayed in this document may differ from those displayed in the SLUA and other BEAD documents, because different calculation methods were used.
b	Total Acres Treated accounts for multiple applications to a single area. This may overestimate the number of acres treated as some acres are treated more than once.
c	Max labeled rate from 2017 EFED 1-3 Master Use Table.
d	Geographic regions based on U.S. Census Bureau regions. Northeast (ME, NH, VT, MA, CT, RI, NJ, NY, PA) North Central (ND, MN, WI, MI, OH, IN, IL, IA, ND, NE, SD, MO) West (WA, OR, CA, ID, NV, MT, WY, UT, CO, AZ, NM) South (OK, AR, TN, KY, WV, MD, DE, VA, NC) Deep South (TX, LA, MS, AL, GA, SC, FL)
e	Where available, market rank is provided in addition to percent of market by weight.

Prepared by Claire Paisley-Jones, 26 April 2018.